



PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Thread Control Device for Sewing Machines

We, DURKOPPWERKE AKTIENGESELLSCHAFT, a German Company, of 3 Schillerplatz, Bielefeld, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a device for the control of the needle thread in the formation of the thread loops for the loop-taker.

In the embroidering of the edges of a material in the manufacture of ornamental shell edges and like work by means of zig-zag sewing machines, the needle penetrates alternately through the workpiece material on the one hand and past the edge of the workpiece on the other hand. Hereby there is always the possibility of thread breakage, in particular when the sewing machine is to be driven at high speed. A thread breakage is always unavoidable if, when the upward moving needle has formed the usual thread loop for seizing by the point of the loop-taker, a second thread loop is formed from the excess length of thread between the thread supply and the needle eye and likewise lies in the path of movement of the point of the loop-taker.

This undesired loop formation in the vicinity of the loop-taker is particularly present when the needle effects stitching beyond the edge of the workpiece. In this case, the thread loosened from the thread take-up, since it undergoes no tensioning due to friction against the workpiece, can form a second thread loop below the needle plate, which loop, when seized by the loop-taker, leads to thread breakage.

For the purpose of preventing thread breakage, a thread guide has already been proposed which is arranged on the needle clamp on the needle bar in order by deflection of the thread thereon, to prevent the loosened needle thread on its way between the needle eye and the thread take-up form-

ing a second loop in the vicinity of the needle. This known thread guide solves the problem only inadequately, as it is uncontrolled and therefore is in operation in both directions of movement of the needle bar. The loosening of the thread caused by the thread take-up at the critical moment cannot be obviated so that, furthermore, there remains the possibility of a further running of the thread through the thread guide to the needle. Furthermore, with this known thread guide, there results an additional friction on the needle thread due to the deflection by said guide being continuous, which is undesirable in high-speed sewing machines.

The main object of the present invention is to provide an apparatus for the control of the needle thread when forming the thread loop for the loop-taker which prevents with certainty the above-mentioned undesired second loop formation.

The invention aims furthermore at providing a device for this purpose which is simple in construction and which can be applied without trouble to existing sewing machines.

The invention provides a sewing machine including a device for the control of a needle thread in the formation of thread's loops for the loop taker characterised by a thread deflection member moving with the needle bar and automatically caused by its inertia to form a deflection loop in the thread as the needle bar is accelerating upwards and to relieve the thread as the needle bar is accelerating downwards.

In the preferred arrangements the thread deflector; which may be a wire stirrup formed substantially U-shaped, is pivotally mounted on the needle clamp and moves past a guide hole in such clamp through which the thread goes to the needle.

The invention will now be described as to one embodiment, with reference to the accompanying drawings, wherein:—

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Fig. 1 is a perspective view of the lower end of a needle bar with the deflecting member in the position occupied when the needle bar begins its upward movement;

5 Fig. 2 is a side view to a smaller scale, showing the position of the deflecting member when the needle bar is accelerating downwards;

10 Fig. 3 is a vertical section through the stitch-forming tool and the needle plate shortly before the entry of the loop-taker point into a satisfactorily-formed thread loop;

Fig. 4 is a vertical section on the line IV—IV of Fig. 3, and

15 Figs. 5 and 6 show the possibilities of faulty loop formation without the use of the device according to this invention, when carrying out raised stitches by the needle.

20 On the needle bar 1 (Figs. 1 and 2), there is located a needle clamp 2 for the fixing of a needle 3 by means of a clamp screw 4. A U-shaped bent wire stirrup 5 is rotatably mounted in the openings 6 of the needle clamp 2 by the two inwardly-turned ends of its arms. The wire stirrup 5 may be supported by its two arm resting on two projections 7 extending laterally from the needle clamp 2. The extent of upward deflection of the wire stirrup 5 is limited by its contact on the raised end face of the needle clamp 2.

30 A bore 8 running obliquely to the axis of the needle bar 1 serves for the guiding of the needle thread 9 which, coming from a thread take-up (not shown) above the wire stirrup 5, is led through the bore 8 to the needle eye 10. The needle 3, after its passage through the stitch hole 12 in the needle plate 11 (Figs. 3—6), co-operates with a loop taker 13 which rotates twice for each needle oscillation.

40 As illustrated in Figs. 3 and 4, the needle 3 allows a loop 14 to be thrown out for seizing by the loop-taker point 15 as soon as the needle begins to move upwards. As shown, the friction occurring between the thread 9 and the workpiece 16 prevents the upward passage of the excess length of thread, at which point the loosening of the needle thread by the take-up means for the enlargement of the needle thread loop after the loop-taker point has entered it, has already commenced.

50 If, however, the needle 3 does not go through the workpiece, in the carrying out of so called raised stitches, for example when embroidering the workpiece edges by means of a zig-zag stitching, there is the possibility that the excess needle thread 9 released by the thread take-up can come unhindered through the stitch hole 12 and through the needle eye 10 and now form an enlarged loop 17 as illustrated in Fig. 5, which loop in this case can still be seized by the loop-taker point

15. Frequently, however, the case shown in Fig. 6 occurs in that a second loop 18 is formed between the needle plate 11 and the needle eye 10 which becomes placed around the needle 3 and is now seized by the loop-taker together with the loop 14, whereby a thread breakage results.

70 The device according to the invention aims at a satisfactory formation of thread loops for the loop-taker as shown in Figs. 3 and 4, when carrying out raised stitches. This is attained in that as the needle bar 1 is accelerating upwards the wire stirrup 5 serving as a thread deflecting member is caused by its inertia to come automatically against the two lower stops 7 on the needle clamp 2, whereby the excess length of thread located between the thread take-up and the needle eye, in consequence of such deflection, is formed positively into a loop 19 (Fig. 1) located outside the stitch-forming tools. When the needle bar 1 is accelerating downwards, the wire stirrup 5, likewise owing to its inertia, contacts the raised end face of the needle clamp 2 (Fig. 2), whereby the deflection of the needle thread 9 ceases and also no additional friction on the thread can be occasioned by the wire stirrup 5.

WHAT WE CLAIM IS:—

1. A sewing machine including a device for the control of a needle thread in the formation of thread loops for the loop-taker, characterised by a thread deflection member moving with the needle bar and automatically caused by its inertia to form a deflection loop in the thread as the needle bar is accelerating upwards and to relieve the thread as the needle bar is accelerating downwards.

2. A sewing machine as claimed in Claim 1, wherein the said deflection member is pivotally mounted on the needle clamp and moves past a guide hole in such clamp through which the thread goes to the needle.

3. A sewing-machine as claimed in Claim 2, characterised in that the thread deflection member consists of a thread stirrup formed substantially U-shaped and pivotally arranged on the needle clamp, which wire stirrup as the needle bar accelerates upwards, lies on two projections on the lower part of the needle clamp owing to its inertia, whereby the excess length of thread located between the thread take-up and the needle-eye, in consequence of the deflection, is formed into a loop and, as the needle bar accelerates downwards such stirrup contacts in the same manner the end face of the needle clamp, whereby the deflection of the needle thread into the said loop ceases.

4. A sewing machine as claimed in Claim

3, constructed and adapted to operate substantially as the embodiment herein described with reference to and as illustrated in the accompanying drawings.

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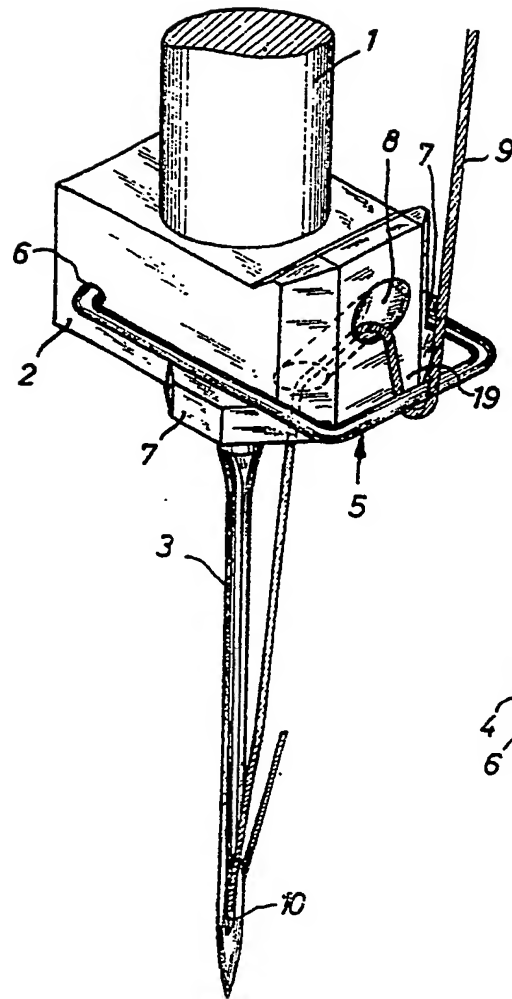


Fig. 1

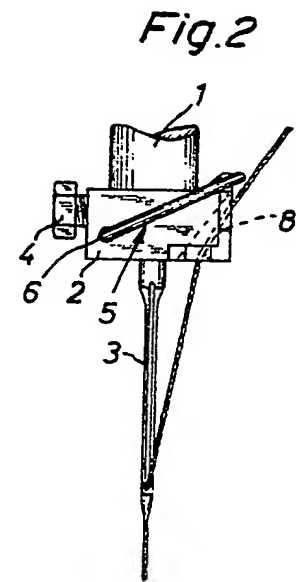


Fig. 2

